CD ROM GAMES

THE COMPLETE ACE GUIDE TO CD-ROM GAMES.

An up-to-the-minute report on the hardware, the software, and the outlook for the entertainment medium of the '90s.





CD-ROM GUIDE

We all know that CD-ROM is the entertainment medium of the future. This booklet brings you bang up to date with all the latest developments on the CD-ROM entertainment market.



A Philips AT with CD-ROM drive built-in as standard. The new Headstart machine is set to revolutionise low-cost CD PC technology at around £1250.

THE HARDWARE

CD-ROM has for so long been a technology of the future that it comes as a surprise to many people that there are so many CD-ROM drives already available on the market, whether they are internal drives to be fitted into a spare floppy disk slot, standalone models or even drives designed for portables. The catch, as far as games players are concerned, is that they are nearly all for the IBM PC standard. With NEC's endorsement of CD-ROM storage for the PC Engine, the scene is set to change dramatically. Currently over half the entire world installed base of CD ROM drives is attached to PC Engines. CD ROM is above all an entertainment technology. The fact that business tends to require writeable media, whereas an uncopyable read-only media is ideal for games, is also driving CD developers towards entertainment and away from the business heavyweights.

Commodore's work on a CD-ROM version of the Amiga (see later) is sympotmatic of this change in emphasis. However, until that becomes available - and it could be this year - CD technology in the games market will be confined to some pioneering PC titles, console implementations, and the 'halfway house' route taken by Code Masters, using CD audio players to hold computer software. In the meantime, this booklet will get you right up to date with developments in the state of the CD art.

First, what's the situation with regard to the major entertainment computer systems?

IBM PC-COMPATIBLES

Many of the well-known PC compatible manufacturers - Elonex and Dell, for example - will configure their PCs with an integral CD-ROM drive in place of one of the floppy disk drives during the coming year.

The best-known company in this field is probably the CD audio and CD-ROM pioneer Philips, which, together with Sony back in June 1985, defined the first CD-ROM standards (see below).

Philips is currently selling its CD-ROM drive both as a standalone device and built into its AT-compatible Proline series in the UK. The machine also has a 40Mb hard disk and a floppy drive and prices range from ***.

In the US, however, Philips handles the dedicated Headstart PC with CD-ROM drive - Headstart is now a subsidiary of Philips. Philips UK is being somewhat coy about Headstart's chances of being released in the UK, but we reckon the sub-$2,000 Headstart system will be launched in the UK sometime this year. The Headstart system represents a revolution in pricing terms and was recently very well received at the Microsoft CD ROM Conference.

The currently available standalone CD-ROM drives, as opposed to those built-in to the system as standard, are compatible with either IBM PCs and compatibles, or the Apple Macintosh family, and some with both - with the exception of the Next drive for the Archimedes (see below). Hitachi has about 70% of the CD-ROM drive market at the moment; its internal CDR-3600 is frequently found in PC CD-ROM configurations. Philips uses its own CM121 drive in its PC, while drives from Toshiba and NEC have a SCSI interface which enables them to be connected with both the Apple Macintosh or PCs - with the relevant interface kit.

NEC also produces a portable version, the CDR35, designed primarily if not exclusively for use with laptop PCs.

APPLE MACINTOSH

The Apple CD SC (£895) is Apple's own standalone CD-ROM drive, aimed especially at the education market and for use with Hypercard applications. Apple has itself released software for schools and colleges for use with the CD-ROM drive.

ACORN ARCHIMEDES

The Archimedes CD-ROM drive has been developed by Acorn jointly with Next Technology (of Cambridge - not to be confused with Steve Jobs' NeXT Inc). It's suitable for use with all

the Archimedes models and also with the A3000 - the lower cost Archimedes-compatible machine laucnhed by Acorn last year. A complete system with Archimedes computer, CD-ROM drive, cabling and retrieval software will start at £2,000 - the standalone drive is about £600. Also plays CD Audio. Acorn and Next are currently negotiating with publishers for CD-ROM software to be available - expect first applications to be heavily education orientated.

COMMODORE AMIGA

Still very much under wraps, Commodore is desperately trying to keep its CD-ROM based Amiga a secret. This is an Amiga with no keyboard, a CD-ROM drive in place of the disk drive, two joystick ports, a disk drive port, and 1Mb RAM. It will play audio CDs too, so you can play your favourite music on it once you've loaded a game into the Amiga's RAM. Commodore has shown it to all the major UK developers to drum up software support and hopes to have it ready for an autumn launch. However, its price, initially, at any rate, looks as though it could be close to £1,000.

ATARI ST

It is ironic that there is currently no dedicated Atari ST CD-ROM drive, since Atari was one of the first companies to launch such a device, way back in 1985. The company always said it would only make it commercially available if it could be sold for under £400 - even these days Atari says it doesn't believe the market is ready yet.

ST owners shouldn't despair however. Atari is well-known (if not notorious) for being able to take quick decisions about its product range. If Commodore's CD Amiga (above) looks like being a success, you just might see Atari's equivalent appear faster than you thought.

8-BIT MACHINES

No dedicated CD-ROM drives as yet, but a number of enterprising publishers are producing CD compilations which you can load from a CD on a conventional CD audio player. Code Masters, Rainbow Arts and Cosmi are all involved in this area - see below for details.

FUJITSU FM TOWNS

Thought we'd pop this in just to make your mouth water! In a class of its own this, sinceIntel 80386-based 32-bit machine with built-in CD-ROM from Japan, becoming available in the US, but not yet over here. A number of US companies have however, already begun development work for the machine. As a computer it offers up to 2MB RAM and the option of a 5.25" drive in addition to the CD-ROM drive. The operating system is similar to MS-DOS, although it's not PC-compatible, with a graphical user interface and mouse ocntrol. Graphics are, at the highest resolution, 256 colours from a palette of over 16 million on a 640 x 480 display. It also boasts 8-channel sound and will function as an audio CD player - so you'll have somthing to do while you wait for the first software to become available.

Prices start at 338,000 yen (£1,500). No UK release date as yet.

CONSOLES

PC Engine – With the PC Engine still not officially launched in the UK, it's not too surprising that the PC Engine's CD-ROM drive isn't officially available from NEC either. However, should you wish to get your mitts on a CD-ROM drive for your PC Engine, they are obtainable from Active Sales & Marketing (01-384 2701) at £399, which is exclusive of VAT, but does include a free game and PC Engine interface. Having got your PC Engine CD-ROM, see below for software availability.

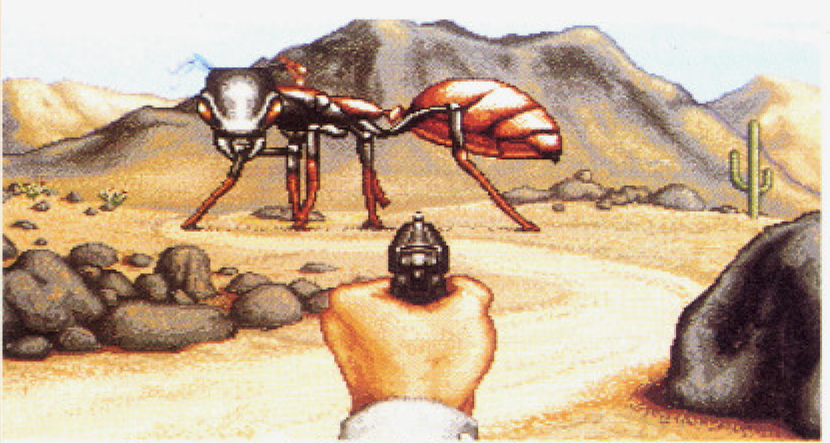
Sega Megadrive – It's been rumoured for a while, and yes, Sega will be introducing a CD-ROM drive for its Megadrive system. Details are patchy - no pricing or release details as yet.

THE GAMES

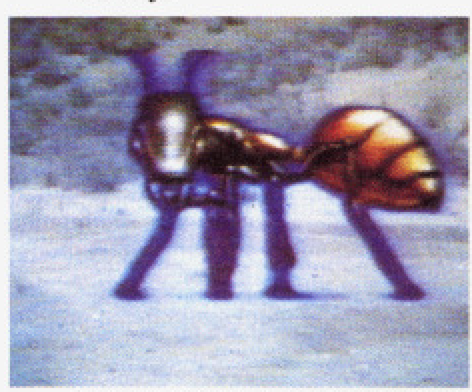
CD-ROM games haven't really arrived in the UK yet. What we have are a few brave souls willing to test the water in the hopes that the money spent on development now will give them a technological lead in the future. However, it's important not to get too carried away with the prospect of superb games and massive playing areas - you may find that for the next couple of years CD-ROM games are disappointingly similar to their floppy disk-based counterparts.



Film licenses are likely to undergo a dramatic revolution once CD ROM becomes widely accepted. Games like Back to the Future II (shown here, due out this summer from Mirrorsoft) will be able to use backgrounds from the film rather than pixel backgrounds. The soundtracks will also be available for use in the game, and with clever game design you could even use some of the action itself.



Cinemaware are using CD technology to combine memory intensive video backgrounds and animation with computer generated images. Compare these two shots from the game, one taken from the standard ST version and the other taken from a preproduction CD version: the pixel background has been replaced with a video image.



The CD-ROM is essentially a storage medium in the same way that the floppy disk is. No CD-ROM can give your EGA PC the graphics of a Macintosh or an Archimedes. Sound should be a definite improvement, though, because it can be output through the CD's audio channels (virtually all CD-ROM drives can play CD audio - but audio CD players cannot use CD-ROM software). While the game has the potential to be much much bigger, at the moment it is unlikely to be greatly expanded - this is where software publishers start getting out their calculators and dividing the expected sales by the extra program development time.

The first three titles listed here use CD audio rather than CD-ROM technology. We've included them as an example of how the massive storage space of CDs can be put to good use in computer games.

AVAILABLE NOW:

1ST CD EDITION

Rainbow Arts

Supplier: retail outlets, £29.99

Format: Commodore 64

Not a CD-ROM product as such, *1st CD Edition* uses an ordinary audio CD player linked to the C64 via the cassette port. The compact disk simply provides a fast access, very large storage mechanism. The digital data on the CD is converted to an analogue signal to 'play', ie, load the programs into the computer where the analogue data is converted back into digitally encoded form. The advantages, from the buyers' point of view, is that loading from CD is considerably faster than loading from tape (or Commodore 64 disk drive). Plus the fact that 30 games on a single CD takes up much less space than 30 games in separate cassette/disk boxes and is cheaper to buy in this form.

The package includes cabling to hook up your CD player to the C64, plugging into the 64's cassette port using the small interface supplied.

1st CD Edition comprises *David's Midnight Magic* (Broderbund), *Leader Board* (US Gold), *Mission Elevator* (Softgold), *Impossible Mission* (Epyx), *Dropzone* (US Gold), *Loderunner* (Broderbund), *Solomon's Key* (US Gold), *Jinks* (Rainbow Arts), *MULE* (Electronic Arts), and *Fist II* (Melbourne House). All rather long in the tooth and some of them now pretty dated, but undeniably good value.

There are currently no plans for a second CD Edition, nor any conversions to other formats.

CD TOP TWENTY SOLID GOLD DEVELOPER

Cosmi

Supplier: Electronic Zoo, £19.95

Format: Commodore 64

Like the two above, uses CD audio as a storage medium. Twenty titles, including *Forbidden Forest, Caverns of Kafka, Slinky, Potty Pigeon* and *Grand Master Chess*. It does seem ironic that advanced technology is being used to hold games that are, well, old, but again, you can't fault the value for money.

CODE MASTERS CD GAMES PACK

Code Masters

Supplier: retail outlets, £19.99

Format: Spectrum (out now), Commodore 64 (out now), Amstrad (scheduled for April-May)

Also not a CD-ROM product, Code Masters followed Rainbow Arts' lead by storing a compilation of titles on an audio CD with this 30 game compilation which was originally released last Christmas.



Rainbow Arts' CD ROM 1st Edition uses conventional analogue/digital conversion to load game data from a CD into a C64 using a simple interface and an audio CD player.

Code Masters supplies a lead which plugs into the headphone socket of your CD audio player and the joystick port of your computer (if you have a portable CD player with a mini headphone socket an adapter is available).

Unfortunately, Code Masters encountered compatibility problems with some audio CD players (a Sharp model was one which reported difficulties) in the digital to analogue conversion. The Darlings went back to base to write a new suite of loading programs and a diagnostics program for identifying any future glitches which may occur. The new Spectrum and Commodore 64 are now back out again - the CPC version should follow shortly.

The games on the compilation are all old Code Masters favourites, from *BMX Simulators* to *Treasure Island Dizzy* - and scarcely any left out along the way.

DEFENDER OF THE CROWN

Cinemaware

Supplier: Mirrorsoft 01 928 1454, £50.00

Format: IBM PC-compatible (EGA graphics)

A genuine CD-ROM game and probably the world's most famous example, if only because for so long it's been the only one available. Set in Mediaeval times, you must joust and battle your way to land and glory in the persona of either a Saxon or Norman lord. Robin Hood pops up occasionally as well. This is the PC EGA version with added sound effects (especially those coconut shells being clacked together as you ride from joust to joust).

VIRGIN: NORTH POLAR EXPEDITION

Virgin Interactive Publishing

Supplier: Virgin Mastertronic Price: £100-£200 (check your requirements with Virgin)

Format: IBM PC-compatible (out this month); Acorn Archimedes (to follow)

Just creeps into the games section, although it's mainly for educational use. This is the CD-ROM version of the package Virgin initially developed for the BBC Domesday system a few years back, which recreates the Trans-Polar expedition led by Ranulph Fiennes. Look out, too, for Virgin to back Commodore's Amiga CD-ROM system

PC ENGINE

This format is beginning to come into its own on the NEC machine and imported titles are becoming more widely available from dealers (try Micro Media on 0698 824647 if you can't find anyone local). Games available include the very Japanese-style *Noriko* and *Noriko II*, based on a Japanese pop singer, *Space Adventure, Wonder Boys II and III*, and *Altered Beast*. Currently in stock at Micro Media and recommended is *Far East of Eden* which boasts sound effects by Ryuchi Sakomoto (of Merry Christmas Mr Lawrence fame). High quality sound is as you would expect the major advantage that the CD-ROM versions have over cartridge versions.

COMING SOON (AND NOT SO SOON)

Many of the titles below are in development abroad (mostly the US), and official UK release times can be vague. We have tried to restrict ourselves to those titles which are "definitely" to be released in the UK ... this year, next year, sometime ...

SOFTWARE TOOLWORKS CD GAMES PACK

Software Toolworks

Supplier: Mindscape UK Format: PC Release date: this year

A CD-ROM compilation as opposed to CD Audio, Software Toolworks' Games Pack was developed as part of a deal for Headstart in the US (for whom Toolworks also wrote the Headstart machine's retrieval software). Priced at $99 in the US, where it is now available,

it comprises *Chessmaster 2000, Life and Death, Beyond the Black Hole, Gin and Cribbage* and *Bruce Lee Lives*.

Mindscape itself is also planning a CD-ROM compilation this year and is actively talking to other software houses regarding suitable games for inclusion. Of Mindscape's own titles, expect *Balance of Power* to be putting in an appearance.

MANHOLE
Activision/Cyan
Supplier: Activision
Format: Apple Macintosh, Fujitsu FM Towns, Philips Headstart Release date: TBA

EUROPEAN SPACE SHUTTLE
Coktel Vision/Tomahawk
Supplier: Active Sales & Marketing
Format: PC Release date: June-July 1990

Essentially the same as the conventional disk but with added sound effects, this is a strategy game - selecting equpment, crew members, fuelling your space shuttle - as much as anything, though dexterity is called for in the landing procedures.

COSMIC OSMO
Activision/Cyan
Supplier: Activision
Format: Apple Macintosh Release date: TBA

Activision's two CD-ROM titles have been some of the first out in the US, launched early last year. Colour versions of *Manhole* are now being released for the FM Towns and Headstart.

CHEAPER GAMES?

What is frequently not realised is that CD-ROM is a cheap medium. Replicating CDs could cost you as a publisher (buying in bulk, and at trade prices) as little as £2.00 per disk (including the price of the blank CD) and you have at least 550Mb to fill up. What isn't cheap is the development work required. Even a game like Space Ace, whose code was compressed on to four 3.5" disk drives, would only take up around 0.7% of a CD. And if you're going to publish on the medium, you might as well take advantage of the extra space that's there. Geoff Brown, managing director of US Gold seriously doubts whether developers will be able to fill the 550Mb of a CD satisfactorily. "The problem is the limit on how much time to spend on development - it may be that soon a programmer cannot necessarily fill a CD-ROM." Geoff Heath of Mindscape says that publishers shouldn't be too concerned about filling up every last byte of your 550Mb, but that a computer equivalent of the CD single might be a viable option.



Mirrorsoft boss Peter Bilotta relaxing on the beach at Nice after announcing at a recent conference that his company would be actively pursuing CD ROM development. See ACE issue 32 for the full story.

Cosmic Osmo in its CD-ROM version takes up over 100Mb (still doesn't fill the CD, of course) and boasts extensive 'world within a world' features. For example, if you spot a chemistry set in the corner, you can opne it up and start mixing the chemicals; you can play arcade games on arcade machines portrayed within the game, and so on.

Both titles should become available in the UK when the hardware is also released. They sell in the US for around $40-$50 - a special 'introductory' price to get the market moving.

BATMAN DIGITAL JUSTICE
Warner New Media
Supplier: TBA
Format: Apple Macintosh Release date: TBA

Batman story based on computer-generated DC Comic by Pepe Moreno (see Ace, issue 30). Ambitious project which Moreno hopes will be released on a number of formats, including PC and Amiga CD-ROM.

TITAN
Titus
Supplier: Titus/Entertainment International
Format: Fujitsu FM Towns Release date: TBA

Arcade puzzle game, also in development for the forthcoming Philips/Sony CD-I platform.

LOOM

Lucasfilm

Supplier: US Gold

Format: Fujitsu FM Towns Release date: 1991

Similar to the standard version of Brian Moriarty's graphic adventure, currently on the verge of being released, but with greatly enhanced sound.

ZAK MCKRACKEN

Lucasfilm

Supplier: US Gold

Format: Fujitsu FM Towns Release date: 1991

Don't hold your breath - these three from Lucasfilm are still in development in the US (see ACE, issue 31). However, US Gold, which sells Lucasfilm product in the UK, has confirmed that it will be handling CD-ROM product from its US partners as they become available. 'Not this year,' says US Gold's chief Geoff Brown firmly.

IT CAME FROM THE DESERT

Cinemaware

Supplier: Mirrorsoft

Format: IBM PC-compatible, PC Engine Release date: TBA

Massive project involving footage of live actors to be subsequently digitised with computer-generated backgrounds (see ACE, issue 31), rather than the direct transfer of the PC format to CD. The ants will remain computer-generated, though. No UK release date yet.

Cinemaware is also involved in a joint product with NEC entitled *Lords of the Rising Sun* - of which details are very scarce.



The CD ROM version of The Guinness Book of Records enables you to combine photographic, audio, and textual reference material in one program. Full-frame animation, however, as with all current CD ROM standards, is not possible because the computer cannot transfer data from the disk fast enough. Future versions of CD ROM (CD ROM XA with full motion video) should be able to do this.

INDIANA JONES - THE GRAPHIC ADVENTURE

Lucasfilm

Supplier: US Gold

Format: Fujitsu FM Towns Release date: 1991

TWEET TWEET!

With all the 'mights', 'maybes' and 'TBAs' above, you could be forgiven for thinking that CD-ROM is really all a very long way off. Certainly, in the games field, it's in its infancy. But in the field of large databases, or mass storage of text, there is no shortage of CD-ROM product.

ACE readers are unlikely to wish to browse through the complete set of UK postcodes on CD-ROM, but how about browsing through a CD-based Guinness Book of Records - with music, and animated sequences to demonstrate records? Here are just a few of the products which blur the lines between heavyweight applications, and entertainment.

COMPTON'S MULTIMEDIA ENCYCLOPAEDIA

Encyclopaedia Britannica

Supplier: Universe Services Price: TBA - between £500-£800

Format: PC Release date: TBA

Sister-encyclopaedia to the slightly better-known Britannica, Compton's is available in book form only in the US. Its CD-ROM version will has powerful search facilities, a pop-up dictionary for any unfamiliar words, and a human voice pronunciation for each, and includes, for example, a gazetteer-type module where you you can 'point and click' at a rotating globe to zoom in on further information - then click again for a deeper zoom, and so on.

CHESS DATAROM

Supplier: Optech 0252 714340 Price: $700 (ask Optech for sterling equivalent)

Format: PC

Heavyweight chess database featuring all games registered (around 35,000 of them) in the Chess Informant database, published in conjunction with the international chess federation. Inlcudes players' names and ELO rankings, comments on each game and its progress.

CD-GUIDE

Supplier: Optech 0252 714340 Price: £99.00 (or subscribe annually for £250)

Format: IBM PC-compatible

A database of virtually all audio CDs released to date - if you subscribe you receive a disc update quarterly. It's not just a text-based list of titles, artists and catalogue numbers, though. You can search the database according to any of these criteria, but also listen to snatches from the records themselves, view full colour pictures from the covers, and read

reviews of the music culled from CD magazines. (A cheaper option, from the same supplier, is the CD-ROM Audio Sampler, which catalogues the audio CDs available from Nimbus Records, with sleeve pictures, track information, comments and a sample of the music. Price £20.)

GUINNESS DISK OF RECORDS
Mirrorsoft
Supplier: Mirrorsoft 01-928 1454 Price: £49.99 (introductory offer)
Format: Apple Macintosh (available now); IBM PC-compatible (available June-July)
CD-ROM version of the best-selling book. Text is taken from the book, supplemented with copious pictures, diagrams, maps and of course sound effects to back up the text. Search for the records you're interested in - or simply browse through - using the Hypercard-style menu format, either by subject or via a generic index. Sound includes digitisation of the world's fastest backwards talker, and classical music excerpts, animated sequences include fastest flying jet and world's tallest man

ELECTROMAP WORLD ATLAS
Supplier: Optech 0252 714340 Price: £135.00 Format: IBM PC-compatible
View all the regions and countries of the world - both physical and political information included pictorially. Menu system at the top of the screen enables you to call up textual information - on the climate, economy, people, etc, of the region shown on-screen.

ORIGINAL OXFORD ENGLISH DICTIONARY
Supplier: Optech 0252 714340 Price: £500.00 Format: PC
CD version of the 1933 OED (1989 version won't be available for a couple of years yet). Mainly text-based, with powerful search facilities to match instances of words you choose throughout the entire dictionary.

ELECTRONIC WHOLE EARTH CATALOGUE
Broderbund
Supplier: Domark 01 780 2222 Price: TBA Format: PC
Almanac in CD-ROM form, to be used as a reference guide to books, magazines, music, etc. Contains reviews, sound effects - even a comprehensive set of bird calls for the budding ornithologist.

SHAREWARE GOLD VOLUME 1
Supplier: Optech 0252 714340 Price: £55 Format: PC
Wide selection of Shareware programs authorised by the Association of Shareware Professionals. Program selection is fully menu-driven. Alternatively, for the Apple Macintosh, PD-ROM (£99) contains thousands of Public Domain utilities.

Also available from Optech are *The Complete Works of Shakespeare* (£70), *The Complete Sherlock Holmes* on disk (£70), and the King James version of the Bible (£65), all on CD.

Another forthcoming product for cartographers and philologists to watch out for is an atlas/gazetteer (the exact title has yet to be finalised), developed by Virgin Interactive Publishing and available (eventually) for the PC from Virgin Mastertronic on 01 727 8070 at a price to be announced. This is an all-in-one atlas, gazetteer, photographic file and database on the physical and political features of the world. Virgin is also demonstrating its commitment to this market with a forthcoming CD-ROM simulation of life in West Africa, which is intended for educational use. This project is being developed in conjunction with Cambridge University, and has already been two years in developement, with miles of film footage being taken by people on location in Africa.'

THE TECHNOLOGY

The compact disk is a development by Philips from its own 12 inch Philips Laservision discs which made their appearance in the 1970s. Although it was audio compact disks which first made an impact, it was apparent that the medium would be particularly suitable for use as computer data storage. All information is stored on CD digitally. When you play an audio CD the CD player converts the digital data into an analogue signal. On a CD-ROM drive this conversion isn't made to play digital data - instead it is controlled directly into the computer. However, most CD-ROM drives will also play audio sound through a set of attached speakers, or through the computer.

In June 1985, Philips and Sony joined forces to issue a CD-ROM standard, initially known as the High Sierra standard, and now ISO 9660. This defined the 12cm diameter of the disks - identical to that of CD audio - the data structure of the information stored on the disks and a technique ensuring reliable reproduction of data as standards for the CD-ROM industry.

Since then, a new format, CD-ROM XA, has been agreed, between Philips, Sony and Microsoft, as a 'bridge' between CD-ROM as used with a PC-compatible computer using MS-DOS, and in a CD-I machine. Software conforming to the CD-ROM XA standard can be played in both.

CD-I already exists in rudimentary form. The essential difference between the two is that where CD-ROM is largely text-based with limited pictures and animation, CD-I in its later versions offers full motion vide and audio and enables the user to interact more with the software. Philips, Sony and Matsushita are collaborating to market and promote CD-I, but the first Philips' CD-I machines are not expected until 1991.

A compact disk is made out of very pure polycarbonate plastic - a similar material to that used to make bullet-proof windscreens and motorbike crash helmets. A thin layer of aluminium is applied to the surface to make it reflective, and finally a protective layer of lacquer - to stop the aluminium from oxidising.

Digital data on a compact disc is arranged in reverse fashion to that of a vinyl record - in

a tightly packed spiral track running from the centre to the outside edge. CD data is stored as a series of tiny indentations in its plastic surface. When the laserbeam read-head travels over the surface of the disk, it 'measures' the intensity of light being reflected back off the surface - which varies according to whether that part of the disk is pitted or not. From these readings of low vs high intensity - as in binary on-off fashion - a digital signal can be output. All this takes place on a disk 12cm in diameter - each CD will contain millions of these microscopic indentations. Accurate readings are made possible by the fact that each piece of data is read not just once but many times by different laser beams being projected on to the disk surface at varying angles.

With a compact disk there are no dire warnings about not leaving it near magnetic fields, or letting it get too hot, too cold, spilling coffee on it, etc. Made of durable plastic, compact disks have a reflective metal coating and a lacquered surface, giving them a characteristic prismatic sheen.

In theory, you can use it as a frisbee, or immerse it in water. In practice, however, it is becoming apparent that CDs aren't quite as indestructible as thought, and some basic care is needed in handling them. CD-ROM retailer SilverPlatter reports that it receives returned CDs which have been damaged by scratches, or being forced into conventional disk drives (!). Scratches are most likely to corrupt or erase data if they are circumventional, ie, if they follow the path of the recorded data. Radial scratches, ie, a straight scratch from the centre to the outside edge, is less likely to cause problems. The best advice is to treat CDs as you would a floppy disk - with care.

Data access times on CD are fast (varying according to the CD-ROM drive, the computer and the retrieval software), but it's not necessarily in the games arena that this becomes a noticeable advantage. Products like encyclopaedias, the OED and Guinness Disk of Records can search through the CD stupendously fast; accessing your comparatively tiny amount of data for a game may not look quite so wonderful in comparison

CD-ROMS - SOME STATISTICS

You can store over 550Mb of data on a CD-ROM. This is equivalent to: 250,000 pages of A4 text 5,000 colour photographs 72 minutes audio sound 1,500 low density 5.25" disks 760 conventional 3.5" disks.

A blank CD costs less than £1.00 - around 80p.

The development of the audio compact disk was announced by Philips in 1978. The first audio CDs went on sale in 1982. According to the British Phonographic Industry (BPI), CD albums accounted for 25% of overall record sales (and sold two million units more than conventional black vinyl LPs) in 1989, and 18% of UK households now have CD audio players.